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# A DOUBLE HEN'S EGG[1]

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DOUBLE hens' eggs have always attracted much attention and the literature covering the records and descriptions of the various kinds has become extensive. In a comparatively recent paper published in this journal, Parker[2] has reviewed the main contributions to the subject and from a consideration of these, together with his own observations on five double eggs, has been led to the conclusion that at least two factors are involved in the production of such eggs. According to him, double-yolk eggs are produced when there is a simultaneous discharge of two yolks from the ovary, whether these are derived from a single follicle or from two separate follicles; while inclosed eggs may be the product of a normal ovary and probably are produced through the abnormal action of the oviduct, "in that a yolk normally supplied by the ovary may be abnormally covered, retained and inclosed in another egg." Parker therefore classifies the factors concerned in the formation of double eggs as ovarian and oviducal. Three types of double eggs result from the action of these two factors: (1) those in which the yolks have been derived from an abnormal ovary but have traversed a normal oviduct, (2) those produced by an ovary and an oviduct both of which have functioned abnormally, (3) and those in which the yolks have come from a normal ovary but have passed through an abnormal oviduct.

The egg described in the following pages clearly belongs to the third type, and since it possesses certain

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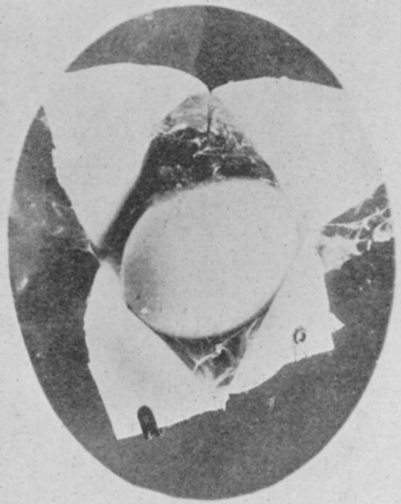
[1] Contributions from the Zoölogical Laboratory of the University of Texas, No. 107.

[2] "Double Hens' Eggs," by G. H. Parker, AMERICAN NATURALIST, Vol. XL, 1906.



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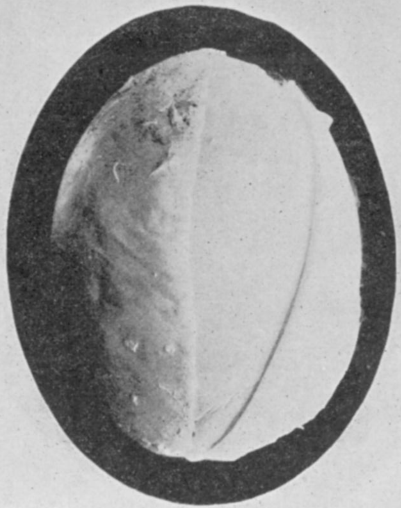

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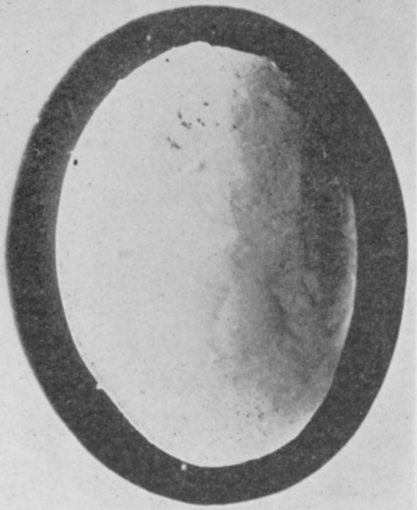

1.

FIG. 1. A photograph of the egg. × ⅔.

FIG. 2. In this photograph the egg is shown after an incision had been made in the outer membrane and the upper margin of the cut turned back so as to reveal the inner membrane. Note that while the outer membrane shows deposits of lime, especially on the smaller end of the egg, the inner membrane, on the contrary, is entirely free from such deposits. × ⅔.

FIG. 3. This shows both membranes cut open and the contents of the egg clearly revealed. The dark mass lying just to the left of the inclosed egg is the yolk of the inclosing egg. × ½.

peculiarities that have not appeared in any previous account, seems to be worthy of record. It should be kept in mind, however, that the value of such descriptions does not come from the morphological features revealed, no matter how bizarre these may be, but from the fact that considerable light is often thereby shed on the complex physiology of the reproductive organs, and it is with this idea in mind that the following record is made.

The egg in question, which was kindly handed to me by Mr. S. L. Pinckney, Austin, Texas, was laid March 28, 1910. It was stated that several double eggs had been received from the flock from which this egg came, but whether they were all laid by the same hen could not be ascertained. The egg was large, measuring 85 mm. in its long axis and 62 mm. in the short axis, and was slightly smaller at one end than at the other, so that we may speak of the blunt and pointed ends. It was practically a soft-shelled egg, in that the amount of lime deposited on the shell-membrane was very small, and for the most part was collected into little nodules scattered about over the surface (Figs. 1 and 2). A microscopical examination of the shell-membrane did not reveal anything unusual, for it consisted of the two characteristic layers, a thick outer and a thinner inner; but on cutting it open I was surprised to find another shell-membrane lying almost directly beneath it (Fig. 2). The two membranes were separated by the very thinnest layer of watery albumen. This second or inner membrane was in every way normal, and perfectly white, but was entirely void of lime deposits, reminding one very much in its general appearance of the membranes on eggs which have just reached the isthmus.

The contents of the inner shell-membrane consisted of much albumen in which were imbedded a hard-shelled egg and a yolk (Fig. 3). Upon examination the inclosed egg was found to be perfectly normal in every respect, and its yolk contained a healthy blastoderm. The inclosed yolk, although normal in structure, was much distorted, owing to the pressure exerted upon it by the approximation of the hard-shelled egg. The albumen closely adhered both to the egg and to the yolk, but much of it was of a liquid nature, as was indicated by the ease with which it flowed out of the cut first made in the inner membrane.

The accompanying diagram will make clear the relation of the various parts of this interesting monstrosity (Fig. 4). The inclosed egg lies toward the pointed end

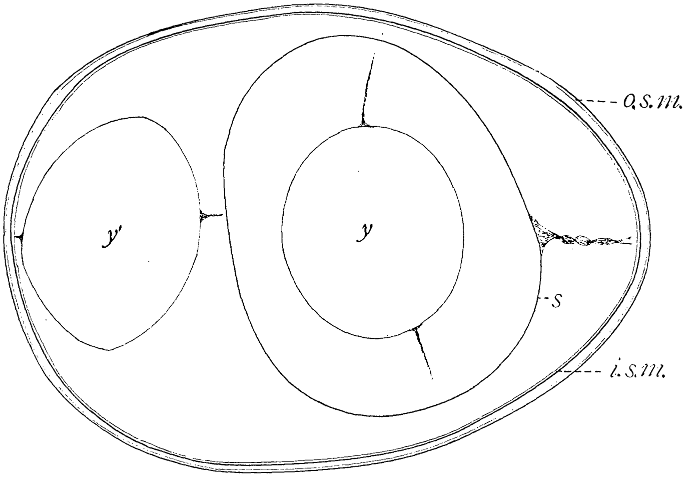

FIG. 4. Diagram of a median section of the egg. *i.s.m.*, inner shell-membrane, the two lines representing its two layers; *o.s.m.*, outer shell-membrane; *s*, shell of the inclosed egg; *y*, yolk of the inclosed egg; *y'*, yolk of the inclosing egg. Natural size.

of the inclosing egg, and its long axis meets the corresponding one of the double egg at an oblique angle. On account of this inclination of the inclosed egg its pointed end lies nearer to the blunt than to the pointed end of the inclosing egg. The inclosed yolk occupies the blunt end of the inclosing egg and is considerably distorted by pressure. The chalazæ are but poorly developed, but the axis formed by a line passing through their points of attachment to the vitelline membrane approximately coincides with the long axis of the inclosing egg, showing that the yolk has maintained its original orientation.

As I have pointed out above, the most interesting question regarding this egg pertains to the physiology of its formation. Parker states that two hypotheses have been advanced to explain how inclosed double eggs are formed. According to one of these, which was first advocated by Panum,[3] the inclosed egg remains in the distal part of the oviduct until overtaken by a second one, when both are then surrounded by a common envelope; according to the other a completely formed egg is carried by antiperistalsis back up the oviduct, where it meets a second one, and the two passing down become covered by a second shell and are laid. It seems quite evident from the description of the egg just given that it is the product of antiperistalsis, but the especial interest lies in the fact that this process has taken place twice.

The first antiperistalsis took place immediately after the hard-shelled egg was formed, and of course caused its migration to the upper or proximal end of the oviduct where it met the second egg. This meeting must have taken place very close to the infundibulum, for otherwise the yolk of the second egg would have possessed much larger chalazæ.

The second antiperistalsis occurred immediately after the inner of the two shell-membranes had been laid down, and must have succeeded in carrying the double egg up the oviduct to a point where albumen is secreted, that is, to a place slightly above the beginning point of the isthmus; for it is only on this assumption that we are able to explain how a thin layer of albumen came to exist between the two shell-membranes. The small amount of lime deposited on the outer of the two shell-membranes indicates that the egg did not remain long in the uterus, but must have been laid shortly after having entered that organ.

In many respects this egg conforms to the facts already seen in the inclosed types of double eggs; thus the inclosed egg lies near the pointed end of the inclosing one, and it was laid during the time of year when such eggs most frequently appear, that is, in the winter or spring; but it differed in one rather important respect. The pointed end of the inclosed egg does not lie in the same direction as that of the inclosing one. This unusual position of the inclosed egg doubtless has been brought about by crowding, and does not indicate necessarily that it was at first incorrectly oriented.

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[3] Untersuchungen über die Entstehung der Missbildungen zunächst in den Eiern der Vögel,'' by P. L. Panum, Berlin, 1860.

Among the more important things so far revealed by a study of inclosed double eggs is the light thrown on the problem of the orientation of the egg in the oviduct, a problem in which the writer has been deeply interested. These eggs clearly demonstrate that when an egg has once entered the oviduct its original orientation in that organ is maintained during the formation of the envelopes, no matter to what extent it may have been moved up and down the reproductive passage. This fact strongly supports the conclusion reached by the writer[4] in a recent contribution, in which it was pointed out that the definite orientation of the egg in the reproductive passage is not a matter of chance, but is something that is handed on to the oviduct by the ovary, that is to say that the ova in the ovary have a definite polarity which is passed on to the oviduct through the mechanism of the infundibulum.

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[4] "The Early Development of the Hen's Egg, I., History of the Early Cleavage and of the Accessory Cleavage," by J. Thomas Patterson, *Journal of Morphology*, Vol. 21, 1910.